

## J.21.1 System Description, Electric.

### J.21.1.1 Service Area Served.

a. Reservation Boundaries. The system areas to be included in this contract include all areas within the reservation boundaries. The primary distribution system is divided into three basic areas: Facilities in or served from: (1) the main post area; (2) Constitution Island; (3) and the “remote” areas (hereinafter referred to as the Camps) which include but are not limited to the Ranges, Training areas, Camp Natural Bridge, and Camp Buckner. The USMA system equipment includes primary and secondary overhead and underground electrical systems; distribution transformers; regulators; substation switchgear; oil and air switchgear and switching cabinets.

b. Excluded Lighting. The following lights are on post, but will not be part of the electrical distribution system contract: street lights, parking lot lights, area lights, stadium and ball field lights, tennis court lights, basketball court lights, security lights, obstruction lights, street and area lights in installation housing, and perimeter lights.

### J.21.1.2 Operating Voltages.

a. Main Post: The standard (nominal) primary distribution voltage of the main post is 13.8/7.97 kV, three-phase, four wire (multi-grounded common-neutral); 4.16/2.4 kV three-phase, four wire (multi-grounded common-neutral); and variations of single-phase, two and three-wire (multi-grounded common-neutral) 13.8/7.97 and 4.16/2.4 kV. The post's standard nominal utilization voltages are: 120 or 240 volts, single-phase, two-wire; 120/240 volt, single-phase, three-wire; 120/208 volt, three-phase four-wire; 277/480 volt, three-phase, four-wire; 240/480 volt, three-phase, three-wire and any possible combination for power use. New South Post operates on a 13.2/7.62 kV, three-phase, four-wire wye system. Secondary voltage is 120/208, three-phase and 480/277volt, three-phase.

b. Constitution Island: The standard primary distribution voltage of Constitution Island is 2.4 kV, single-phase (single-grounded, separately derived).

c. Camps: The standard primary distribution voltage of the Camps is 4.16/2.4 kV three-phase, four wire (multi-grounded common-neutral).

### J.21.1.3 Power Supply Points.

a. Main Post: The system consists of two system-tie locations at a voltage of 34.5 KV with Orange and Rockland Utilities. The West Point 2 and Delafield Pond feeders enter the post at Substation A, and the West Point 1 feeder enters at the Wilson Gate Regulator Station. From Wilson Gate, power is supplied to New South Post at a voltage of 13.2 KV. Additionally, there is an alternate feed directly from Orange and Rockland Utilities, which enters the south end of New South Post at a voltage of 13.2 KV.

~~b.b.~~ Constitution Island: The power supply point for Constitution Island is located at the railroad station at Cold Spring, where Central Hudson Gas & Electric Co. provides power at 2.4 kV.

~~e.c.~~ Camps: There are two locations where power is brought into the Recreation and Training areas.

- (1) One is from a transfer station on Mine Torne Road that feeds 4.16 kV north towards West Point. It supplies single-phase power to Bull Pond, Range 2, Range 3 and Range 5, and a three-phase feed to Range 3.
- (2) The second service is from the Area W metering point, feeding south along Route 293. It supplies power to Camp Natural Bridge, Camp Buckner, several ranges, and the Round Pond Recreational Facility.

~~d.d.~~ Secondary Points of Connection:

~~(1)~~**(1) Lake Frederick is located on Smith Clove Road.** The feed to this site is 120/208 V, three-phase, four wire.

~~(2)~~**(2) Morgan Farm** has a secondary feed from Orange and Rockland poles - 120/240 single phase

#### J.~~2~~1.4 General Information.

a. The existing distribution feeder circuits from the substations have adequate capacity, circuit protection, and isolation switches that will enable the shifting of loads from one feeder to another (loop and back-feed). Most of the three phase feeders are tied together through the use of air-break, gang-operated switches (normally open).

b. Approximately 98% of the post-wide electrical distribution system is located underground.

? This includes 439 manholes and 410,475 linear feet of predominantly concrete-encased duct banks.

? There are approximately 547,339 feet of primary cable and 150,660 feet of secondary cable.

? Most primary feeder runs are 4/0 cable with EPR insulation and a 133% insulation level. There is some cable with XLP cable, 133% insulation level used intermittently.

? This includes the 35 kV, 15 kV and 5 kV feeder runs.

? Most of the underground cable is less than 15 years old (post-1989). There are only two 15 kV feeders still in service that were installed prior to 1970. USMA has been on a cable-replacement program since 1989, replacing approximately 40,000 to 44,000 linear feet of cable per year.

c. Overhead

? There are three 15 kV overhead feeders on the main post with approximately 30 poles and associated hardware, and one 5 kV feeder run, which supports part of the Ski Slope, the Golf Course Irrigation System, and Quarters 1280 along Route 293.

? All the Camp electric is overhead 4.16 and 2.4 kV primary to 120/240 V and 120/208 V secondary.

? Constitution Island is fed from Central Hudson utilities at the Cold Spring Train Station with 2.4 kV. Government ownership starts at the fused cutout at the train station. The line runs approximately one mile along the railroad tracks, and then cuts over to Constitution Island, where it is stepped down to low voltage for residential use.

? All overhead electrical poles on the main post were installed between 1975 and present day.

? All overhead electrical poles located off-post are dated from 1952 to 1995. Several poles along Route 293 are the oldest. Round Pond's overhead distribution system was rebuilt four (4) years ago. The Camp Buckner and Camp Natural Bridge systems were rebuilt approximately six (6) years ago.

d. Circuit protection is provided by a combination of relays, circuit breakers, vacuum circuit breakers, fused line cutouts, and oil switches.

? Lightning arresters are installed at the main substations and all pad-mounted and pole-mounted transformers are equipped with surge arresters.

J.21.1.5 System Equipment Inventory Data.

The system inventory is provided in Attachment 8. The inventory contains a list of poles, conductors, transformers, switches, substation equipment, lights, with age and quantity. (NOTE: Quantities are approximate and based on 2001 information. Some secondary conductors are included.) This information can be accessed by viewing the individual feeder run files.

**J.12.1.5.1 Substation Information** (Available at USMA Library – Coordinate with USMA POC)

- ? Substation Plan Map – with ownership boundaries depicted
- ? Substation Single Line with device and bus ratings shown
- ? Substation equipment inventory with dates of manufacture
- ? Digital Photos of the substation
  - Photos showing layouts, equipment locations, gates, fences, structures, buses, transformers, switchgear, etc.
  - Photos showing transmission line feed(s) to the substation
  - Photos showing the distribution feeders and poles/structures leaving the substation
- ? Substation Meter Readings (12 month) – Feeder ammeter, kWh meters, kVa meters, kVar meters (if available)
- ? Substation Transformer Testing and Maintenance records
- ? Substation Breaker Testing and Maintenance records
- ? Substation Grounding System Tests.

**J.12.1.5.2 Studies and Requirements**

- ? Known Deficiencies List – Unfunded Requirements. Postponed rehabilitation, remediation, maintenance. See paragraph J.1.3 Needed upgrades planned for Electric Utilities-Feeder Cables and Switch Stations.

**J.21.1.5.3 Existing Conditions** The following information is available in the on-site Library. Coordinate with USMA POC Frank Monahan 845-938-5851

- ? Existing operating procedures.
- ? Existing maintenance procedures.
- ? Existing safety plans.
- ? Existing emergency/disaster recovery plans/procedures.
- ? Pole Inspection results (if available).

? Outage Records – causes, durations, frequencies, conditions. Last Three Years

Date	Location	Comment
<b>2000</b>		
3-31-00	F-15	
4-21-00	F-2	
4-27-00	F15-E	
5-1-00	F12	
5-8-00	Bull Pond Overhead	
5-18-00	F-15	
7-26-00	F-15-F	
9-7-00	A-9 Overhead and underground	
9-11-00	A-9 Overhead and underground	
11-15-00	F-15-E	
<b>2001</b>		
2-20-01	Main Switch-1 Sub Station A	Contractor Tripped Relay
4-26-01	A-11	Contractor Drilled thru Conduit
5-2-01	A-1	Contractor Digging hit cable
5-31-01	Main Switch-1 Sub Station A	Tripped
6-9-01	Camp Natural Bridge Overhead	Transformer Fault Replaced
6-13-01	E	Contractor Digging hit cable
6-30-01	A-9 Overhead and underground	Faulty Arrestor
7-12-01	Camp Natural Bridge Overhead	Faulted cable to Ejector Station
8-16-01	Camp Natural Bridge Overhead	Ejector Station
<b>2002</b>		
1-16-02	C-1-D	Faulted Cable in Man Hole replaced cable
1-27-02	606 Main	Main Breaker tripped, found no fault
2-6-02	C-1-D	Fault cable replaced
3-8-02	F-14-F	Blown fuse to Michie due to inrush current
5-2-02	C-1-D	Cable Fault burned wire at cut out
5-28-02	A-9 Overhead and underground	Transformer blown at cell tower - lightning
Mid 2001	A1, A11	Contractor working at Michie caused two outages.
6-24-02	A-9 Overhead and underground	Truck hit telephone line –tripped breaker
7-23-02	Constitution Island Overhead	Line down



Date	Location	Comment
7-23-02	Range Control Overhead	Fuse & wire burned - replaced
8-18-02	C-1-F	Multi cable fault in man hole - repaired
8-12-02	C-1-F	Faulted cable -repair
10-22-02	C-2-B	Faulted cable -repair
11-29-02	B-Transformer	Tripped on reverse current

? Integrity of the underground system.

-Design standard life. On Inventory- replacement is generally scheduled for end of life

-Component specifications. - On Inventory & Library

-Design Standards –

US Army Corps of Engineers

Present standards of materials as recommended based on experience ( For example Cable used is 4/0 EPR Cable with 133% level, Known manufacture of mechanical splices and inline splices. Further material is defined in the library)

- Cable replacement/repair records.

#### **J.21.1.5.4 Environmental Records.**

? PCB replacements done in early 90s. Testing every three years by contract.

? No known spills of PCB contaminated oil.

? Contracted Support – Temporary/Periodic

-Tree trimming/ROW maintenance – Performed by Contract and in-house

-Pole Testing - None

-Oil-Filled Device Tests – Performed every three years

-Breaker maintenance - Performed in-house per Preventive Maintenance Schedule

#### **J.21.2 System Ownership Boundaries and maps.**

The following boundaries apply except as otherwise noted. These maps have an accuracy of approximately 90 percent.

##### **J.21.2.1 Medium Voltage Primary.**

For each primary meter service point described below, ownership will begin at the load side of the serving company's meter point (or other point of demarcation between the Government-ownership and the serving utility), and will end at the service lateral point described below, except for training ranges.

a. **Main Post:** At West Point 1 (Wilson Gate), the Contractor will own and maintain the entire substation from the point where Orange & Rockland Utilities Co. attaches their line down through the subsequent medium voltage distribution. At Substation A (West Point 2/Delafield Pond), the Contractor will own and maintain the system from the primary side of the disconnect switches feeding the two 1.2 MVA transformers down through the subsequent medium voltage distribution system.

For the alternate 13.2 kV feeder at New South Post, the Contractor will own and maintain the system from the primary side of the pole-mounted fused cutouts, located at the southeast corner of the property line.

At the power plant, the point of demarcation will be at the cable connection to the 5 kV switchgear bus inside the plant. The operation of the power plant will remain the responsibility of the Government.

During emergencies, the Contractor may be required to perform medium voltage switching so that the power plant can supply critical loads on post. At the Power Plant **Qualified Post Electricians** working with the **Contractors Dispatcher** will perform switching to allow the Power House to direct emergency power to critical areas.

This activity will be performed on an as needed basis, and **as directed by the Contracting Officer.**

Additional clarification in establishing a point of demarcation for the electrical distribution system.

If privatization occurs it is proposed that the high side of the high voltage switch before the transformer be the demarcation point for the contractor in sensitive areas described below. It is also proposed that the high voltage employees of the government be responsible for the operation and maintenance of these switches. In the event of a fault downstream of the switch, the government employees would operate the switch to isolate the equipment from the distribution system so that the contractor can perform its' testing to find the fault.

If the fault should lie between the high side of the switch and the first manhole on the exterior of the building then a joint effort would be considered for a remedy.

The list of sensitive areas is as follows:

- 1) Building- 600 Head Quarters
- 2) Building-601 Thayer Hall
- 3) Building –605 Cullum Hall
- 4) Building –606 Admissions
- 5) Building –607 Lincoln Hall
- 6) Building –655 Eisenhower Hall
- 7) Building 727 Arvin Gym
- 8) Building 745 A/B/C/D/E barracks complex
- 9) Building 759 The Jewish Chapel

- 10) Building 752 Mahan Hall
- 11) Building 753 Bartlett Hall
- 12) Building 756 A/B Barracks complex
- 13) Building 757 Library
- 14) Building 900 Keller Army Hospital

This list may be amended as needed.

All other transformers and exterior vaults and pad mount transformers will be the property of the contractor and all maintenance or operation would be his/her responsibility.

b. **Camps:** For training ranges (e.g. the Multi-purpose Range Complex (MPRC) and others) where medium voltage primary is routed downrange, the contractor shall own, operate, and maintain the electrical system to the low side of each downrange, pad-mounted transformer and pole-mounted transformer. For other ranges and for services to range buildings the contractor's responsibility shall be as described below for services.

For service to integrated or articulated secondary unit substations the contractor shall own, operate, and maintain the electrical system to the low side terminals of each pad-mounted transformer.

c. **Constitution Island:** For Constitution Island, the contractor shall own, operate and maintain the electrical system to the low side terminals of each pad-mounted transformer.

#### **J.21.2.2 Service Laterals.**

For aerial services, the Government shall assume responsibility at the service entrance connection point (weather head), with the Contractor owning and maintaining everything on the distribution system side.

For underground medium voltage services to buildings or facilities, the Government shall assume responsibility: at the primary terminals of oil-filled transformers installed in vaults; and at the line side lugs of the building main disconnect switch (i.e. service entrance) for other buildings or facilities in which no medium-voltage, oil-filled equipment is involved, with the Contractor owning and maintaining everything on the distribution system side including service entrance conductors.

#### **J.21.2.3 Street Lighting and Area Lighting.**

The street lighting and area lighting will remain with the government.

#### **J.21.2.4 Maps - Available on CD**

All base mapping that shows electrical distribution including substations, primary, secondary. Single-line diagrams and switching diagrams are provided.

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### J.21.3 Needed upgrades planned for Electric Utilities-Feeder Cables and Switch Stations

Feeder~~s~~ A4 and Feeder A8. are both funded for replacement in 2004. ~~Entire length of both feeders need to be replaced because they are thirty years in the system.~~

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- ~~? The useful age of the cable has passed its limit.~~
- ~~? The length of each feeder run is 8,626 feet starting at Delafield Substation and ending at Mahan Hall with connections to the barracks and the Power House.~~
- ~~• There is currently a work order in system to replace these feeders~~

South Switch Station building 832.

- All the equipment is obsolete and a safety hazard.
- Old 5 kV oil switchgear needs to be replaced with new modern 15 kV switchgear and the switch building needs to be expanded or replaced to meet standard codes
- In House Engineering Staff, Engineer Plans & Services (EP&S) has started plans for this.

North Switch Station building 715

- All existing 5 kV oil switches need to be eliminated and the feeder cables need to be consolidated into the existing 5 kV electromechanical switchgear.
- The switchgear will need minimal modifications to accommodate the feeder cables.
- New switchgear for the 15 kV feeders in the same building needs to be installed and the cables need to be rerouted to the gear. Realistically, there is no code violation here; it will depend on how the Contractor wants to run their system, whether or not he'll want to break up into smaller sections.
- Room for future expansion is included in the design
- In House Engineering Staff, Engineer Plans & Services (EP&S) has started plans for this

Sub Feeder C-1-D upgrade work was completed in 2003. ~~There are changes and upgrades being planned in the vicinity of the US Mint. US Mint is doing this planning at this time. There might be other changes to the feeders in that area as a result of their planning.~~

Sub feeder C1E feeds a few housing units. It is being condense with feeder C-2-B over the next two years

~~Sub Feeder C1F also being condensed and replaced with 15 kv over the next several years based on availability of funding for housing renovation.~~

Sub Feeder C2B - Being converted to 15kv as part of housing renovation planned over the next 2-3 years.

Sub-feeders D1 and D2-Feeds the South Gym-To be replaced by 2005 as part of Gym upgrade.

*RA-1 and RA-2 (1955), serve Thayer Hall, main academic building. To remove and replace, in its entirety, feeder RA-1 and RA-2 cables from building 604, the power plant main BUS to building 601. These combined cable lines are approximately 6,220 liner feet, type 4/0 ETR Shielded 133% insulation (2006).*

*Replace existing transformer and transformer switch which were installed in 1965 with a new 6MVA transformer and a new automatic transfer switch to serve the majority of the central post areas. Replace cables from the "B" transformer to the main bus. (2006)*